

REMARKS

Claims 1 and 3-9 are pending in the above-identified application.

Claim 2 has been incorporated into claim 1. Claims 3 and 4 have been amended consistent with the changes to pages 6 and 7 of the specification in order to correct minor typographical errors. It is submitted that these minor corrections do not constitute prohibited "new" matter, since a person of ordinary skill in the art would easily and quickly recognize these minor errors, and understand that the named compounds are "(meth)acrylate esters". Please also note that the examples, such as Synthesis Example (1a) at page 13 of the specification, employ the "2-ethyl-2-adamantyl methacrylate" ester which would confirm to a person of ordinary skill in the art the identity of the esters listed in claims 3 and 4 and disclosed at pages 6 and 7 of the specification. Consequently, it is submitted that all of the present claims and the disclosure of the present specification have been properly amended without the introduction of any new matter such that all of the above-noted amendments should be entered of record.

Removal of Claim Objections

Claims 8 and 9 were objected to because of a typographical error. Claims 8 and 9 have been corrected to as to recite the reference to component "(D)" as suggested in the Office Action. Therefore, the basis for these objections has been removed.

Removal of Rejections Under 35 U.S.C. 102(b)

Claims 1, 5 and 8 have been rejected under 35 U.S.C. 102(b) as being anticipated by Padmanaban '690 (USP 5,846,690).

The basis for the above-noted rejection has been removed upon the incorporation of claim 2 (not rejected under 35 U.S.C. 102) into claim 1. Consequently, it is requested that the above-noted rejection be withdrawn.

Issues Under 35 U.S.C. 103(a)

Claims 1-6, 8 and 9 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay '086 (USP 6,492,086) in view of JP '852 (Japanese Patent Application 02-115852 or "Nakamura").

Claims 1-9 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Oomori '704 (Published U.S. Application No. 2002/0034704 A1).

Attorney Docket Number 10/084,182  
Docket No. 2185-0623P

The above-noted rejections are traversed for the following reasons.

Present Invention

The present invention is directed to chemical amplifying positive resist compositions. Upon exposure to light, the acid generator in the compositions of the present invention generates an acid, and the acid catalyzes a cleavage reaction of a protecting group from the resin so that the resin becomes alkali soluble in an exposed resist area.

In summary, JP '852 fails to disclose or suggest any acid generator as required in the present invention; and both of the Barclay '086 and Oomori '704 documents cannot be combined with JP '852 because the components of the compositions of Barclay '086/Oomori '704 serve purposes inconsistent with the components of the composition of JP '852.

Distinctions Between Present Invention and JP '852

An English translations of JP '852 is enclosed. As is apparent from the description of JP '852, specifically the examples therein, the composition disclosed by JP '852 includes an acrylic resin, methyl cellosolve as a solvent, and a plasticizer. JP '852

fails to disclose or suggest the use of any acid generator component as required in the present invention. In fact, the compositions described in JP '852 do not require any acid generator.

Resist patterns using such compositions are formed by a so-called "chain scissioning" mechanism. Upon absorption of deep UV and vacuum UV light, the resist composition undergoes the chain scissioning mechanism, which leads to a reduction of molecular weight of the resin and, as a result, to increased solubility in organic solvents (such as methyl isobutyl ketone, pentozone, butyl cellosolve, pentozone, isopropanol and sylene) in the exposed resist area. Consequently, JP '852 fails to disclose or suggest any basis for employing any acid generator which is a significant patentable distinction from the present invention.

Distinctions Between Present Invention and the Barclay '086 and Oomori '704 Documents

Barclay '086 discloses chemically amplified positive-acting resists which include phenolic/alicyclic copolymers. As seen from the description in "BACKGROUND OF THE INVENTION (columns 1 and 2), the description in column 11, lines 29-33, and the description in Example 8 (columns 19 and 20), the compositions disclosed in Barclay

'086 correspond to chemical amplification type resists containing an acid generator.

Oomori '704 disclosed chemical amplification positive-working photoresist compositions which include various specified resinous components, such as components (a1) or (a2) as noted at paragraph [0028]. As seen from the description in "BACKGROUND OF THE INVENTION" ([0001] TO [0004]), the description in "SUMMARY OF THE INVENTION" ([0007] to [0027], the description on [0044] to [0046] and the description in Examples ([0067] to [0086], the compositions disclosed in Oomori '704 correspond to chemical amplification type resists containing an acid generator.

Both Barclay '086 and Oomori '704 fail to disclose or suggest the inclusion of a polyvalent carboxylic acid ester as in component (D) of the composition of the present invention. Therefore, significant patentable distinctions exist between the present invention and the Barclay '086 and Oomori '704 documents.

Inconsistent Features Prevent Attempt to Combine JP '852 with Either  
Barclay '086 or Oomori '704

The chain scissioning type resist disclosed by JP '852 operates based on a completely different mechanism than the chemical amplification type resist disclosed by both Barclay '086 and Oomori

'704, such that the components of the compositions in each of these two different types of resists cannot be selectively exchanged as presumed in the Office Action. As background, please see the explanation of these two different types of resists in enclosed Exhibit A: K. Jain, Excimer Laser Lithography, SPIE, Bellingham 1990, p. 135-150. The chain scissioning type resists are referred to in pages 139 to 144 (6.2.3 Chain Scissioning Methacrylate Resist), and the chemical amplification type resists are referred to in pages 144 to 155 (6.2.4 Chemical Amplification Resists). Also attached herewith is Exhibit B: A. Uhl, J. Bendig, J. Leistner, U. Jagdhold, J. Bauer, Proc. SPIE 3333, 1452 (1988) (Proceedings of SPIE, Advances in Resist Technology and Processing XV, Volume 3333, Part Two of Two Parts), which explains behavior of the chain scissioning type resists.

As is evident from the portions noted above in Exhibits A and B, the pattern formation mechanisms and mode of reaction for the chain scissioning type resist and chemical amplification type resist are totally different. Specifically, the chain scissioning type resist requires a "chain scissioning" type mechanism, such as the absorption of UV light, so that the molecular weight of the resin in the composition is reduced in order to increase its solubility in organic solvents (JP '852). On the other hand, chemical

amplification type resists operate by causing a change in the solubility of the resin in alkali by cleavage of a protecting group from the resin by an acid generated from an acid generator (Barclay '086 and Oomori '704). A person of ordinary skill in the art would have no reason to expect that a plasticizer component from a chain scissioning type resist composition as disclosed by JP '852 would provide any satisfactory properties when used in the completely different functioning chemical amplification resist compositions of Barclay '086 or Oomori '704 given the fundamentally different operating mechanisms employed by these two different types of resists as clearly evidenced by the discussion above. Therefore, JP '852 cannot be combined with either Barclay '086 or Oomori '704, such that these rejections must be withdrawn.

Failure of All Documents to Recognize Invention Advantages

In addition to the above, even assuming that *prima facie* obviousness has been properly alleged, this obviousness is rebutted by the evidence of unexpected advantageous properties provided in the comparative tests results in the present specification. As seen at page 2, lines 4-6, and page 19, lines 7-10 in the present specification, the present composition exhibits higher resolution without impairing resist performance such as application ability and

sensitivity. Please refer to the Examples and Comparative Examples in the present specification. The composition used in Comparative Example 1 is the same composition and is evaluated in the same manner as in Examples 1 to 8 except that it does not contain component (D) a polyvalent carboxylic acid ester. The composition used in Comparative Example 2 is the same composition and is evaluated in the same manner as in Example 9. As is apparent from the Comparative Examples and Examples, effective sensitivity is not enhanced based solely on incorporating the polyvalent carboxylic acid ester (40 mJ/cm<sup>2</sup> in Comparative Example 1 and 40-44 mJ/cm<sup>2</sup> in Examples 1-8, 34 μC in both Comparative Example 2 and Example 9). The compositions in the Examples (present invention) also have higher resolution than Comparative Examples (0.12 μm in Examples 1-8 and 0.13 μm in Comparative Example 1, and 0.056 μm in Example 9 and 0.13 μm in Comparative Example 2).

JP '852 fails to recognize or suggest any of these advantageous properties. Of course, JP '852 describes a resist composition which operates on a very different mechanism than the resist composition of the present invention. Further, Barclay '086 and Oomori '704 fail to recognize these advantageous properties evidenced by the comparative test results. Consequently, it is submitted that any alleged prima facie obviousness has been rebutted such that the

Attorney Docket Number 10/084,182  
Docket No. 2185-0623P

bases for the above-noted rejections have been removed and these rejections should be withdrawn.

It is submitted for the reasons stated above that the present claims define patentable subject matter such that this application should now be placed condition for allowance.

If any questions arise regarding the above matters, please contact Applicant's representative, Andrew D. Meikle (Reg. No. 32,868), in the Washington Metropolitan Area at the phone number listed below.

Pursuant to the provisions of 37 C.F.R. §§ 1.17 and 1.136(a), the Applicants hereby petition for an extension of three (3) months to February 13, 2004, in which to file a reply to the Office Action. The required fee of \$950.00 is enclosed herewith.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees

Attorney Docket Number 10/084,182  
Docket No. 2185-0623P

required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By

  
Andrew D. Meikle, #32,868

P.O. Box 747  
Falls Church, VA 22040-0747  
(703) 205-8000

ADM:gmh  
2185-0623P

Attachment(s):

- English Translation of JP '852  
Exhibit A: K. Jain, Resists for Excimer Laser Lithography, SPIE Bellingham 1990, pages 135-150;  
Exhibit B: A. Uhl, J. Bendig, J. Leistner, U. Jagdhold, J. Bauer, Proc. SPIE 3333, 1452 (1988) (Proceedings of SPIE, Advances in Resist Technology and Processing XV, Volume 3333, Part Two of Two Parts)